IBM Unleashes World's Fastest Chip in Powerful New Computer

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IBM today simultaneously launched the fastest microprocessor ever built and an ultra-powerful new computer server that leverages the chip's many breakthroughs in energy conservation and virtualization technology. The new server is the first ever to hold all four major benchmark speed records for business and technical performance.

At 4.7 GHz, the dual-core POWER6 processor doubles the speed of the previous generation POWER5 while using nearly the same amount of electricity to run and cool it. This means customers can use the new processor to either increase their performance by 100 percent or cut their power consumption virtually in half.

IBM's new 2- to 16-core server also offers three times the performance per core of the HP Superdome machine, based on the key TPC-C benchmark. The processor speed of the POWER6 chip is nearly three times faster than the latest HP Itanium processor that runs HP's server line. Even more impressive, the processor bandwidth of the POWER6 chip – 300 gigabytes per second -- could download the entire iTunes catalog in about 60 seconds – 30 times faster than HP's Itanium.

But the new server offers more than just raw performance – it is the world's most powerful midrange consolidation machine, containing special hardware and software that allows it to create many "virtual" servers on a single box.

IBM calculates that 30 SunFire v890s can be consolidated into a single

rack of the new IBM machine, saving more than $100,000 per year on energy costs. According to IDC, IBM has gained 10.4 points of UNIX revenue share in the past five years -- versus HP's loss of 5.3 points and Sun's loss of 1.4 points. IBM will use the new machine to target customers with less-efficient HP, Sun and Dell servers.

Benchmark Grand Slam

Demonstrating its remarkable versatility, the new IBM System p 570, running the POWER6 processor, claims the No.1 spots in the four most widely used performance benchmarks for Unix servers – SPECint2006 (measuring integer-calculating throughput common in business applications), SPECfp2006 (measuring floating point-calculating throughput required for scientific applications), SPECjbb2005 (measuring Java performance in business operations per second) and TPC-C (measuring transaction processing capability). This is the first time that a single system has owned all four categories. The new System p 570 now holds 25 benchmark records across a broad portfolio of business and technical applications.

The performance leadership is largely attributed the system's balanced design. Unlike competing servers, IBM succeeded in scaling the new server's processor performance and system design (cache sizes and bandwidth) in a balanced way. The POWER6 chip has a total cache size of 8MB per chip – four times the POWER5 chip – to keep pace with the awesome processor bandwidth. By contrast, many other servers concentrate mainly on processor performance, at the expense of the server's ability to feed data to the chip at a rate that takes advantage of the processor's speed.

"Like the victory of IBM's Deep Blue chess-playing supercomputer 10 years ago this month, the debut of POWER6 processor-based systems proves that relentless innovation brings 'impossible' goals within reach,"

said Bill Zeitler, senior vice president, IBM Systems and Technology Group. “The POWER6 processor forges blazing performance and energy conservation technologies into a single piece of silicon, driving unprecedented business value for our customers.”

The POWER6 Chip: a Convention-Shattering Design

The POWER6 chip in the new IBM System p570 server owns a number of industry “firsts.” It is the first UNIX microprocessor able to calculate decimal floating point arithmetic in hardware. Until now, calculations involving decimal numbers with floating decimal points were done using software. The built-in decimal floating point capability gives tremendous advantage to enterprises running complex tax, financial and ERP programs.

The POWER6 processor is built using IBM’s state-of-the-art 65 nanometer process technology. Coming at a time when some experts have predicted an end to Moore’s Law, which holds that processor speed doubles every 18 months, the IBM breakthrough is driven by a host of technical achievements scored during the five-year research and development effort to develop the POWER6 chip. These include:

-- A dramatic improvement in the way instructions are executed inside the chip. IBM scientists increased chip performance by keeping static the number of pipeline stages – the chunks of operations that must be completed in a single cycle of clock time -- but making each stage faster, removing unnecessary work and doing more in parallel. As a result, execution time is cut in half or energy consumption is reduced.

-- Separating circuits that can’t support low voltage operation onto their own power supply “rails,” allowing IBM to dramatically reduce power for the rest of the chip.

-- Voltage/frequency “slewing,” enabling the chip to lower electricity consumption by up to 50 percent, with minimal performance impact.

-- A new method of chip design that enables POWER6 to operate at low voltages, allowing the same chip to be used in low power blade environments as well as large, high-performance symmetric multiprocessing machines. The chip has configurable bandwidth, enabling customers to choose maximum performance or minimal cost.

The POWER6 chip includes additional techniques to conserve power and reduce heat generated by POWER6 processor-based servers. Processor clocks can be dynamically turned off when there is no useful work to be done and turned back on when there are instructions to be executed.

Power saving is also realized when the memory is not fully utilized, as power to parts of the memory not being utilized is dynamically turned off and then turned back on when needed. In cases where an over-temperature condition is detected, the POWER6 chip can reduce the rate of instruction execution to remain within an acceptable, user-defined temperature envelope.

IBM plans to introduce the POWER6 chip throughout the System p and System i server lines.

World’s first UNIX server with active virtual machine mobility

Also announced today, IBM is unveiling an industry-first with a new feature that provides customers with the ability to move live virtual machines from one physical UNIX server to another while maintaining continuous availability. Coined the POWER6 Live Partition Mobility

function, this technology -- currently in beta, with general availability planned for later this year -- enables customers to move active virtualized partitions without temporarily suspending them. While competing offerings require a disruptive reboot of the UNIX system and software stack, IBM is the first vendor to help clients optimize resource utilization on a broader scale by allowing administrators to think of large groups of servers as a fluid resource rather than focusing on each server as a single entity with a dedicated purpose.

On the services front, IBM Global Technology Services announced implementation, migration & assessment service products that help clients shorten the time required to plan, implement and integrate new System p POWER6 processor-based servers into their production environment.

Source: IBM